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CONTENTS

PEOPLE'S REPUBLIC OF CHINA

NATIONAL POLICY AND ISSUES

Study of Total Population Target
(Ha Baosheng, et al.; XI'AN JAOTONG DAXUE XUEPAO, Apr 81)....... 1

INDUSTRY

Reorganization of Machinebuilding Industry Discussed
(Wu Ming; JINGJI GUANLI, 15 Jun 81) 17

CONSTRUCTION

Journal on Use of Enterprise Funds
(Liu Chunqin; JINGJI GUANLI, 15 Jun 81) 26

NATIONAL POLICY AND ISSUES

STUDY OF TOTAL POPULATION TARGET

Xian XI'AN JAOTONG DAXUE XUEPAO [JOURNAL OF XI'AN JIAOTONG UNIVERSITY] No 2 in Chinese Apr 81 pp 115-125

[Research article by Hu Baosheng [7579 0202 3932], Wang Huanchen [3769 3243 1057], Zhu Chuzhu [4281 2806 3796], Li Weiyue [2621 4850 1471]: "Research and Study on Total Population Target in China"]

[Text]

Abstract

In this paper the problem of total population target in China has been investigated and discussed. More than 20 factors affecting the total population after 100 years have been analyzed from the trends of development and the viewpoints of natural resources, environments, economics, state of population, psychology of all nationalities, etc. System's engineering's multiobjective decision-making techniques have been used to try to treat the dynamic relations among these interactive factors. The optimal target of 0.7 billion is obtained from our investigation. If the results of our efforts are better than our estimations, or if the standard of living of the people is lowered, the optimal population can be increased from 0.7 to 1 billion.

Foreword

What is suitable for "human" habitation at present is our earth. This sets limits to the population of mankind. The whole earth has a surface area of 510 million square kilometers including land area of 148.9 million square kilometers and ocean area of 361.1 million square kilometers. The natural growth rate of world population is 1.8 percent at present. Estimated on the basis of 1 square meter per capita, human beings will fill the land area in 585 years and spread to the whole globe in 653 years--mountains, lakes, plains, deserts, forests, and oceans.

Today, human activity has reached such an extent as to affect nature and the earth itself. This fact poses a question for mankind: Are "the growth in the population of mankind and the improvement in living quality" compatible with "the growth in human capacity" and in harmony with "the environment on which mankind depends for survival?" This question involves social problems of the whole world and each sphere of human activities. Even if it is confined to one country, the factors involved are so numerous and the relationships are so complex that it is difficult to make a generalized study. In this paper, an attempt is made to use the technique of multiobjective decision-making in systems engineering to probe into this question. First, we separate the inter-connections among various factors and separately study the partial effects of individual factors and then sum up their total effects, giving consideration to the interconnections among the various factors.

Through theoretical analysis and estimates, the major cycle of population growth in our country is estimated at about 70 years, which is close to the average lifespan of man. Therefore, in approaching the problem of population control in our country, we should go beyond 70 years to consider policy measures to be taken today. Thus, in this paper we take 100 years as the time range of discussion. This will take account of the tremendous inertia of population process and the possibility of forecast while leaving room for approximate change in the development of things and the policy decision.

Opinions vary over the problem of total population target. Some say 200 million is just right. Others say 300-400 million is proper. Others say 500-700 million is optimal. Still others say 800 million to 1.5-2 billion is also feasible. This shows people are universally interested in this problem. In this paper we join in the discussion and offer our views; more importantly, we apply systems engineering methodology and offer a scientific policy-making method.

We approached the problem from 20 angles, then combined them into nine categories, and finally summed them up as "possible and satisfactory" extent of total population, which is used to reflect the rationality of the total population target in relation to "needs and possibilities," thereby providing a basis for determining the total population target.

1. Land Potential

Our country has 9.6 million square kilometers of land, equivalent to 14.4 billion mu. As things stand at present, there are 1.5-2 billion mu (10-14 percent) of cultivated land, 1.83 billion mu (12.7 percent) of forests, 4-5 billion mu (28-37 percent) of grassland, more than 4 billion mu (27 percent) of wasteland and barren hills, 300-400 million mu (2-3 percent) of fresh water surface, and more than 2.2 billion mu (15.9 percent) of barren soil like deserts and gobi.

Forests play a very important part in regulating the climate and weather and in conserving water and soil. The rates of world forest cover are 22-28 percent, 34 percent for the U.S., 40 percent for the Soviet Union, and 29 percent for Europe. According to estimation by experts in the fields of agriculture, forestry, and ecology, the optimal rate of forest cover is around 30 percent. As far as our country is concerned, forest cover should reach 4.3 billion mu. Within this context, a forest cover rate of 30 percent and more may be considered fully satisfactory. Thus, we take the "satisfactory extent" -- Q_1 ($\geq 30\%$) = 1.0. The present rate of 12.7 percent is extremely unsatisfactory; we take Q_1 ($\leq 13\%$) = 0. The satisfactory extents between 13 percent and 30 percent cover rates are connected with a straight line as indiciated by diagram 1(a).

At the present stage, more than 60 million mu are afforested each year. If the annual afforestation decreases progressively (with afforestation becoming more difficult as time goes on), in 50 years afforestation will increase by 1.5 billion mu, and in another 50 years the forests will be stabilized, bringing the total forest area to 3.33 billion mu and the cover rate to 23 percent. We take the possibility -- P_1 ($\leqslant 23\%$) = 1. By afforesting 70 percent of barren hills and wasteland and 30 percent of deserts and barren soil, the cover rate can be brought to 37 percent. We take the possibility -- P_1 ($\geqslant 37\%$) = 0. The curve is as indicated by figure 1(a).

As to cultivated land, the average around the world is now 10.8 percent; 10.8 percent for the Soviet Union, 22.4 percent for the U.S., and 14.3 percent for Japan. In our country, the reclaimable wasteland is estimated at 1.5 billion mu. This plus 2 billion mu of existing cultivated land may bring the total rate to 24 percent. But there are people who estimate that there is not much wasteland that can be reclaimed and that expansion of forests will affect land reclamation. Now we take the possible extent -- P_2 ($\geqslant 24\%$) = 0, and take P_2 ($\leqslant 14\%$) = 1. The possible extents between 14-24 percent rates of cultivated land are connected with a straight line as indicated by figure 1(b).

2. Water Potential

Our country has 2.7 trillion tons/year of surface water (river runoff) and 1 trillion tons/year of shallow groundwater. These sources of water are replenished by rainwater. In terms of the present water per capita, they are up to only one third the world level (not counting groundwater). The total volume of water used for industrial and agricultural purposes in 1979 accounted for about 18 percent of surface water.

In the United States, annual river runoff amounts to 2.4 trillion tons/year, of which 25 percent had been developed as of 1975, and it is estimated that 40 percent will be developed by the year 2000. Japan has 200 billion tons of surface water and as of the seventies was utilizing 45 percent.

We take the possibility of 50 percent utilization of surface water in our country after 100 years--P_3 ($\leqslant 50\%$) = 1, and take the possibility of 100 percent utilization--P_3 ($\geqslant 100\%$) = 0.

As for groundwater, we leave it out of account because it is not possible to take groundwater as an independent water source. Besides, over-exploitation will cause earth subsidence.

70.8 percent of the earth's surface is oceans, and sea water accounts for 97.2 percent of the total volume of water on the earth--1.3-1.4 billion cubic kilometers. Ice accounts for 2.16 percent, and fresh water 0.64 percent. Thus a huge volume of water is in the oceans. Desalination of sea water consumes enormous amount of capital and energy and we should not place great hope on it at present.

The situation being what it is in various countries of the world, what should be particularly guarded against at present is the pollution of water sources. Our country should pay full attention to this problem and prevent water pollution in the next hundred years. So the curve for the potential of utilizable water is indicated by 1(c).

3. Air Potential

Man is breathing at all times and all animals breathe. They keep inhaling oxygen and exhaling carbon dioxide. Mineral fuels consume enormous volumes of oxygen when burning and generate carbon dioxide.

The supply of oxygen is attributable to photosynthesis of plants. There are 26 billion tons of plants on the land of the earth and 18 billion tons of green planktons in the oceans, consuming 1.6 trillion tons of carbon dioxide and generating 1.2 trillion tons of oxygen.

The percentage of carbon dioxide in the atmosphere is increasing at present. Whether this phenomenon is good or bad has not been determined. Some scientists are of the opinion that the greenhouse effect caused by the increase of carbon dioxide will increase the average temperature on the earth and cause the polar icecaps to melt, submerging vast tracts of land. Others take the view that pollution of the atmosphere and the increase in powder and dust will decrease the quantity of heat of sunlight on the earth, thereby bringing about a new ice age. According to an agriculture science station in the United States, at the present level a one percent increase in carbon dioxide will accelerate photosynthesis 0.5 percent and lend itself to a bumper harvest in agriculture. It has been reported that bumper harvests were gathered in the vicinity of carbon dioxide wells in some parts of our country.

Thus, it is not known what the ideal density of carbon dioxide in the atmosphere is. However, it may be preliminarily affirmed that changes of carbon dioxide and oxygen should approach a balance after 100 years.

Since the atmosphere is a global phenomenon, it has no national boundaries. However, regional effects caused by uneven regional distribution are still existent.

In our country, on the basis of 4.3 billion mu of forests, 5 billion mu of grasslands, and 3.5 billion mu of farm crops, the total capacity for absorbing carbon dioxide is estimated at about 95 billion tons/year. We take the possibility of achieving this as 0, and the possibility of a 35 billion tons/year CO_2 absorption rate with present forests/cultivated land as being 1. The corresponding curves are shown in diagram 1(d).

The ratio of capacity for generating oxygen and that for absorbing carbon dioxide is about 32:44. Thus, there is no need to take carbon dioxide into separate consideration. As for other harmful air pollution, where pollutants cannot be absorbed by green plants, additional measures should be taken to solve the problem.

4. Energy Potential

All activities of mankind are inseparable from energy. Our country is comparatively rich in energy resources. Verified coal reserves have reached 641.8 billion tons, petroleum 2.74 billion tons, and natural gas 700 billion cubic meters. Among the regenerated energy resources, there are about 680 million kilowatts of waterpower, and 1-2.5 billion kilowatts of solar energy. In addition, geothermal, tidal energy and wind energy have exploitable potential, but relatively speaking this is not great. On the other hand, atomic energy and nuclear-fusion have exceedingly great potential.

Taking the country as a whole, in the near future we should fully utilize mineral fuels, particularly coal. Taking a long-range view, we should vigorously develop new energy resources like solar energy and atomic energy. In this way, if all the water energy and solar energy that can be technically and economically opened up are put to use after one hundred years, the total volume of energy will be equivalent to 870 million-1.37 billion tons of standard coal/year. Further, assuming that atomic energy and other new energy resources fully supplant all the energy resources we have at present, there will be energy resources equivalent to 2 billion tons of standard coal/year. After 100 years, this level will be reached if the 1979 energy production level is increased at a progressive rate of 1.175 percent a year.

The annual rate of energy growth was 3.4 percent in the U.S. during 1950-1973. According to estimates by the International Energy Organization, the annual rates of energy growth in the U.S. will be 3.7 percent in 1976-1985, 2.9 percent in 1985-1990, and 2.2 percent in 1990-2000. Corresponding growth rates will be 5.9 percent, 5 percent, and 4 percent in Japan; 2.7 percent, 2.1 percent, and 2.2 percent in the United Kingdom; and 4.9 percent, 4.1 percent and 4.1 percent in France.

During the periods of "first 5-year plan," "second 5-year plan," three-year adjustment, "third 5-year plan," and "fourth 5-year plan," annual rates of energy growth in our country were respectively 18.6 percent, 11.4 percent, 4.5 percent, 9.1 percent, and 7.9 percent. The average rate of annual growth was 10.7 percent during 1953-1978.

In all, the likelihood of an average 2 percent energy growth in 100 years from now on may be taken as 1, and the possibility of a 5 percent annual growth rate may be taken as 0. The curves are indicated by 1(c).

5. Potential in Per Mu Output of Grain

Average output per mu in our country was 137 jin/mu.year during 1949, 332.1-442 jin/mu.year (calculated on the basis of 2 billion or 1.5 billion mu) during 1979. The average annual growth rate was 3.00-3.99 percent. As to world average level of output per mu during 1979, it was 740 jin/mu.year in Japan, 591 jin/mu.year in France, 486 jin/mu.year in the United States, and 528 jin/mu.year in Denmark. During 1949-1979, the average amount of annual grain increase was 6.5-10.2 jin/mu.year in our country. Calculated by arithmetical progression, in 100 years per-mu output will also increase to 982.1-1,461.8 jin/mu.year, and the average annual growth rate will be 0.8 percent-1.1 percent.

In light of the world level mentioned above, we take the possibility of 500 kilograms per mu p6 (≤ 500) = 1. And the possibility of 1,500 kilograms and more p6 (≥ 1500) = 0. The curves are indicated by figure 1(f).

6. Aquatic Production Potential

World catches were 21 million tons during 1950, and reached 69.70 million tons during 1975, with an annual growth rate of 4.9 percent. In addition, worldwide breeding of aquatic products is expected to reach 70 million tons by the year 2000, topping the total volume of the present worldwide catches.

In Japan, where coastal waters are utilized, the area of unit output of fish has reached 5.3 tons/hectare. Our country has 13.5 million mu of shallow coastal waters and 24 million hectares of coastal waters equivalent to domestic shallow water surface. Estimated even on the basis of unit output of 1 ton/hectare, output is expected to reach 24-48 million tons/year.

If estimated according to bait, world fish output may increase by 10-100 times. At a certain ratio our country may have a share amounting to 45.5 to 455 million tons/year.

China's total output of aquatic products was 4.305 million tons during 1979. In light of the above state of affairs, we take the possibility of reaching 20 million tons/year in 100 years, p7 (≤ 0.2) = 1, and take the possibility of reaching 150 million tons/year, p7 (≥ 1.5) = 0. The curves are indicated by 1(g).

7. Economic Development Potential

Except for the 7 items mentioned above which are limited by resources, the various necessities of human life--food, clothing, shelter, and transportation--may be incorporated into the economic development potential and considered in these terms.

GNP is an index of the relative strength of the national economy. GNP may approximately demonstrate the consumption scope in a country.

The ratio of energy growth rate to the rate of gross industrial output is called energy elastic coefficient. Our energy elastic coefficient was 0.95-1.0 during 1950-1978. On the whole, the trend of development of elastic energy coefficients in various countries is on a gradual decline. For example, it was 0.94 in the U.S. during 1950-1973. It is estimated that it will decline to 0.6-0.7 by 1978-1985 and to 0.55-0.65 during 1985-2000. The trend is particularly evident in energy-deficient Japan: it was 1.0 during 1960-1979 and declined to 0.43 during 1975-1978.

Therefore, as far as our country is concerned, along with the spread of energy conservation techniques it can be predicted that in 100 years the energy elastic coefficient will gradually decline to at least 0.5. Thus, on the basis of the possible extent of an annual energy growth rate as indicated by diagram 5 of curves, we can work out the curve of the possible annual growth rate of the GNP. Take 3 percent and 7.5 percent as the turning points, and we get what is indicated by figure 1(h).

8. Per Capita Food Requirements

Man's nourishment is very rich in content, but the most principal and representative indicators are calories and proteins. The World Health Organization has set one standard: 3,000 large calories/person.day for an adult male and 2,800 large calories/person.day for an adult female. The former standard set by our country is close to that while the standard set in the United Kingdom is said to be 2,470-2,567 large calories/person.day. As for protein, the United Nations has proposed 70 grams/person.day, of which 40 percent should be animal protein. China formerly had a standard of 80 grams/person.day. Therefore, we may adopt 2,500 large calories/person.day and 80 grams of proteins/person.day. Animal nourishments accounting for 40 percent are taken as standard nourishment converted into food forms: 400 grams of cereals, 100 grams of animal meat, 80 grams of fish, 48 grams of eggs, and oil, sugar and vegetables.

Thus, the standard grain ration is 400 grams/person.day. This plus fodder grain which is about seven times the amount of meat and also industrial grain and loss which double the amount makes a total of about 800 kilograms/person.year. We take the satisfactory extent -- P_9 ($\geq$800) = 1. As to 400 kg/persons.year, which does not include grain for industrial purposes and loss, we take the satisfactory extent--Q_9 (400) = 0. These are indicated by figure 1(b).

9. Per Capita Livestock Requirements

From the above we come to know that animal meat per capita is 100 grams/person.day, which converts into 3.65 kilograms/person.year. Per capita output was 10.8 kilograms/person.year during 1979.

Total production of pork, beef and mutton amounted to 10.624 million tons during 1979. The corresponding number of pigs was 319.705 million head, that of cattle 71.346 million head, that of sheep 183.42 million head. Now, on a pro rata basis we can work out per capita livestock requirements: 1.1 pigs/person, 0.25 cattle/person, 0.63 sheep/person. Reduced to standard livestock of 50 kilograms each, it is about 5.2 standard head/person. We take the satisfactory extent--q10 ($\leq$5.2) = 0, and take the satisfactory extent (with 50 percent as surplus)--q10 ($\geq$7.8) = 1, as indicated by figure 1(f).

10. Per Capita Fish Product Requirements

From item 8 we know fish requirements per capita are 80 grams/person.day. It is estimated that fish good for food make up about 75 percent of catches, and that half of them are waste. It is known that per capita fish product requirements are 78 kilograms/person.year. We take the satisfactory extent, Q_{11} (78) = 1, and half the satisfactory extent, Q_{11} (39) = 0, as indicated by figure 1(g).

11. Per Capita Energy Requirements

Human activities are inseparable from energy. On the basis of 2,500 large calories/person.day required to maintain the life of each person, the requirements are equivalent to 0.13 ton of standard coal/person.year. And to produce foods with so many calories it is necessary to consume more energy to the extent of from 0.013 to 1.56 tons of standard coal/person.year, depending on the kinds of foods produced. In addition, under conditions of modern society, clothing, food, shelter, transportation, culture and recreation require large amounts of energy. On the basis of 3,099.5 large calories/person.day, it is estimated that 1.615 tons of standard coal/person.year are required.

Per capita consumption of energy is the highest in the United States. Per capita consumption of energy was 11.574 standard tons/person.year in 1977. Japan, a country "deficient in energy" pays great attention to energy conservation; per capita consumption of energy during 1977 amounted to 3.806 tons of standard coal/person.year. Actual levels of consumption in the three major cities of Beijing, Shanghai, and Tianjin during 1979 were respectively 2.24, 1.70, and 1.47 tons of standard coal/person.year. On this basis, we select the satisfactory extent of per capita consumption of energy as follows: q12 (4.0) of 4 standard tons/coal.year = 1, and q12 (1.6) of 1.6 tons of standard coal/person.year = 0, as indicated by figure 1(e).

12. Per Capita Water Requirements

Man cannot live without water. With the development of industry and agriculture, water is increasingly showing its value. Per capita consumption of water in the U.S. reached 2,300 tons/person.year during 1965 and increased to 2,880 tons/person.year during 1975. It is estimated that by the year 2000 per capita consumption of water will reach 4,550 tons/person.year. Per capita consumption of water in Japan reached 789 tons/person.year in the mid-seventies.

In our country, consumption of water for industrial, agricultural and living purposes was approximately 400-500 tons/person.year during 1979. We take the satisfactory extent of 2,880 tons/person.year in the U.S. in the mid-seventies, q13 (2,880) = 1, and take the satisfactory of 500 tons/person.year in our country, q13 (500) = 0, as indicated by figure 1(c).

13. Per Capita Air Requirements

An adult needs 1,000 liters of air a day, inhaling 0.75 kilogram of oxygen and exhaling less than 1 kilogram of carbon dioxide equivalent to approximately 0.365 tons/person.year. In addition, per capita livestock requirements are 5.2-7.8 standard head/person. It is not possible to estimate wild animals. For the time being, we estimate them on the basis of the same number of domestic animals.

The ratio of mineral fuels to energy resources after 100 years is estimated at 50 percent at the highest and 5 percent at the lowest. Carbon dioxide thus generated will be about 0.73-7.3 tons/person.year.

Altogether, the amount of carbon dioxide averages about 4.8-13.4 tons/person.year. The oxygen needed may be worked out at a 32:44 ratio. Figure 1(d) is the curve of the satisfactory extent of per capita carbon dioxide.

14. Per Capita GNP Requirements

From discussions in item 8 it may be realized that this indicator can roughly reflect people's living standards. According to figures released by the World Bank, in 1978 per capita GNP was US$12,700/person.year in Kuwait (world's highest); US$9,960/person.year in Switzerland; US$8,640/person.year in the U.S.; US$5,640/person.year in Japan; and US$3,011/person.year in the Soviet Union. The world average was US$1,800/person.year.

Our country's per capita GNP level is now about one sixth the average world level. The highest world level is 47 times ours. Therefore, it is not so satisfactory for us to reach the present world level after 100 years. We should take q15 (1,800) = 0. The curve is indicated by figure 1(h).

15. Per Capita Housing Space and Land Requirements

The per capita housing space is 29 square meters in West Germany, 18 square meters in the U.S., 13 square meters in Japan, and 7.2 square meters in the Soviet Union. Per capita housing space is 3.6 square meters in our country, and some people estimate that by the year 2000 it will reach 10 square meters. We take 30 square meters and 5 square meters as the turning points of the satisfactory extent of per capita housing space. Housing space accounts for about 65 percent of the area of structure. Streets account for approximately 10-30 percent of the urban areas. It is assumed that land for public buildings is offset by the ground area saved from high-rise buildings.

Urban afforestation area is included in forests and grassland. Factories, mines and transportation use large amounts of land. Over the past 30 years they have taken up 150 to 180 million mu of land.

Taking all this into account, we may take the satisfactory extent of per capita use of land, 0.3 mu/person, q16 (0.3) = 1, and the satisfactory extent of 0.18 mu/person, q16 (0.18) = 1 [as published; should be 0] as indicated by figure 1(i).

16. Possibilities of Land Used for Housing, Industry, and Transportation

Forests, cultivated land, barren hills and waste land make up approximately half of the total area of our country at present. If we want forests to take up 37 percent and cultivated land 24 percent in the future, we will have to turn to deserts, gobi and grasslands, and must use the land sparingly. In the 20 years from 1957 to 1977, cultivated land in our country decreased by 180 million mu, or 10 percent. It is assumed that 15 percent and 30 percent are taken as the low and high points in the possibilities of land for housing, industry and transportation. Taking account of the possibilities of cultivated land (see item 2), we can work out the low and high points, 2.1 percent and 7.2 percent of the total area nationwide.

17. The Lowest Total Birth Rate Acceptable to the Masses

The total birth rate (B) is approximately equivalent to the average number of children begotten by a married couple in their lifetime. The number of births was 2.2 in 1979. If childbirths follow the trend of the past few years and drop by 0.1 a year, childbirths are expected to drop to 1.5 by 1986. By that time, in the rural districts, which account for 80 percent of the total population, 40 percent will have one child and 6 percent two children each. In cities, which account for 20 percent of the total population, 90 percent will have one child each and 10 percent two children each. It is predicted that after 100 years the population will be 603-777 million. We take this possibility, p18 (≥ 7.0) = 1. If within 100 years 100 percent of the population will have one child each, it is predicted that the population will be 233-370 million after 100 years. Under the conditions of our country, it is difficult to achieve this. We take the possibility of this, p18 (≤ 3) = 0 as indicated by figure 1(j).

18. Limit to the Ageing Coefficient

The ratio of persons aged 65 and over to the total population is called the ageing coefficient (l_2). Distribution of the ages of the present population being what it is in our country, to lower the level of the total population in 2080 will certainly bring about a growth of l_2. L_2 in the next hundred years. It is necessary to put forward the hopes for limits of l_2.

From analysis we come to know that with present mortality rates, the corresponding base value of L_2 is about 0.14. This being so, we think that as long as L_2 is smaller than or equivalent to 0.15 it is satisfactory, and that L_2 larger than or equivalent to 0.3 is unsatisfactory. Through calculations based on more than 30 schemes, we have worked out the corresponding total population after 100 years to be 1.4 billion and 500 million. Therefore, we take the satisfactory extent, q19 (≥ 14) = 1, and q19 (≤ 5) = 0. The curves are indicated by figure 1(k).

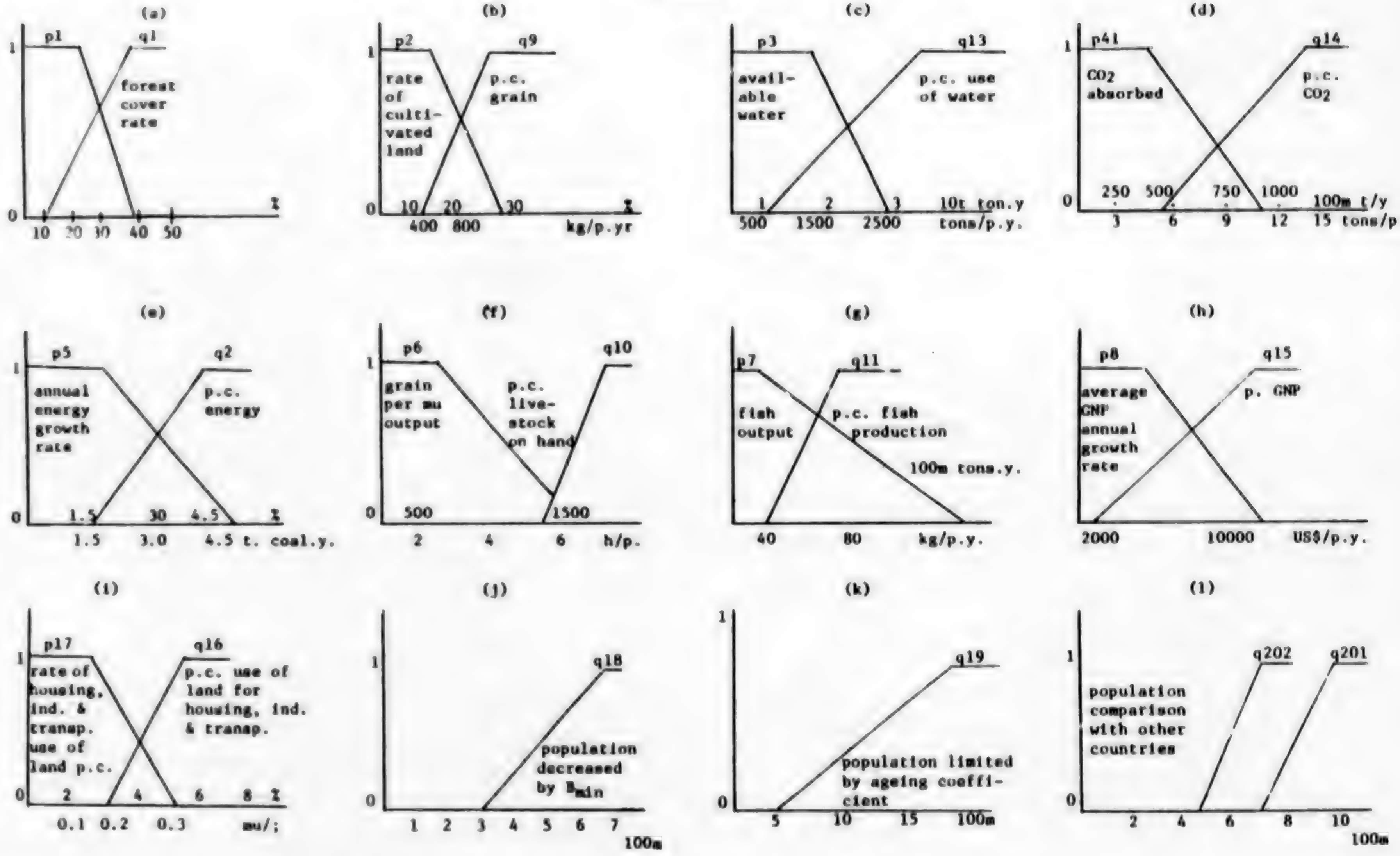
19. Comparison of Total Population with Various Countries

Our country has always been the largest one in terms of population. Total population is one aspect of national strength. Therefore, a direct comparison with various countries should be taken into consideration.

Countries with a population of 100 million or more are China, India, the Soviet Union, the U.S., Indonesia, Brazil, and Japan. In the case of the last four countries, the maximum population does not exceed 360 million. Therefore, what we need to watch is the development of population in the Soviet Union and India.

The Soviet Union is pursuing a policy of population growth. Its present population is 264 million and its natural growth rate is .9 percent. In 100 years constant growth will bring its total population to 647 million. We take its satisfactory extent - q_{20R} (≥ 6.5) = 1 - and take the satisfactory extent of 450 million (30% less) - q_{20R} (≤ 4.5) = 0.

Figure 1


(a)
p1
q1
forest cover rate
1
0
10 20 30 40 50
%
(b)
p2
q9
rate of cultivated land
p.c. grain
1
0
10 20 30
%
400 800
kg/p.yr
(c)
p3
q13
available water
p.c. use of water
1 2 3
10t ton.y
500 1500 2500
tons/p.y.
(d)
p41
q14
CO2 absorbed
p.c. CO2
1
0
250 500 750 1000
100m t/y
3 6 9 12 15 tons/p.
(e)
p5
q2
annual energy growth rate
p.c. energy
1
0
1.5 30 4.5 %
1.5 3.0 4.5 t. coal.y.
(f)
p6
q10
grain per mu output
p.c. livestock on hand
1
0
500 1500
2 4 6 h/p.
(g)
p7
q11
fish output
p.c. fish production
100m tons.y.
40 80 kg/p.y.
(h)
p8
q15
average GNP annual growth rate
p. GNP
2000 10000 US$/p.y.
(i)
p17
q16
rate of housing, ind. & transp. use of land p.c.
p.c. use of land for housing, ind. & transp.
1
0
2 4 6 8 %
0.1 0.2 0.3 mu/;
(j)
q18
population decreased by B_min
1
0
1 2 3 4 5 6 7
100m
(k)
q19
population limited by ageing coefficient
1
0
5 10 15 100m
(l)
q202
q201
population comparison with other countries
1
0
2 4 6 8 10
100m

India has a population of 667 million and its natural growth rate is 2.1 percent. By the end of this century it will grow to 1.0107 billion. Its maximum population is estimated at 1.6 billion. Therefore, we take its satisfactory extent - $q_{201} (\geq 10) = 1$ - and take $q_{201} (\leq 7) = 0$. The above curves are indicated by figure (1).

20. Overview

The above are more than 20 factors considered. Figure 1 indicates the possible extents and satisfactory extents of the various factors. They may be combined by using the technique of multiobjective decision-making techniques in systems engineering. The process of their combination is illustrated by figure 2 with the following results:

1. Viewed from the aspect of grain, the possible-satisfactory extent of total population is 1 when it is less than 1.26 billion, and 0 when it exceeds 6.48 billion.

2. Viewed form the production of fish, the possible-satisfactory extent of total population is 1 when it is less than 260 million; thereafter, it begins to decline slowly.

3. Viewed from the use of land for industrial, transportation and living purposes, the possible-satisfactory extent of total population is 1 when it is less than 1 billion, and will decline to 0 when it exceeds 5.67 billion.

4. Viewed from the use of water, the possible-satisfactory extent is 1 when the total population is less than or equals 450 million, and will drop to 0 when it exceeds 5.4 billion.

5. Viewed from the changes in oxygen and carbon dioxide, the possible-satisfactory extent is 1 when land is rationally distributed and the total population is less than or equals 2.6 billion.

6. Viewed from standpoint of energy, the possible-satisfactory extent is 1 when the total population is less than or equal to 640 million.

7. Viewed from GNP, the possible-satisfactory extent is 1 when the total population is less than or equal to 640 million.

8. Viewed from the process of population development, the possible-satisfactory extent is 1 when it exceeds 1.4 billion and is 0 when it is less than 500 million.

9. Viewed from the comparison of population with other countries, the possible-satisfactory extent is 1 when the total population is larger than 1 billion, and is 0 when it is smaller than 450 million.

Curves of the above possible-satisfactory extents are indicated by diagram 3. If these factors are satisfied fully and simultaneously, the highest possible-satisfactory extent is only 0.25, which is obviously not good enough. Here we can find that water consumption, GNP, and population development process produce the greatest effects. The process of population movement is caused by the present surging distribution of population ages. As a result of estimations and calculations based on "scores of plans," it is discovered that the proportion of old people around 2040 will be too large, making it necessary to make arrangements at an early date. As to use of water, care should be taken to use water rationally and to prevent pollution. As to GNP, efforts must be made to strive for steady, high-rate growth.

From different viewpoints, six plans are listed below (see "Comparative Table of Six Plans for Total Population Target in China"). From the table it may be noted that if we consider only food and things for use and the economic strength, it would be advisable to keep the population target below 540 million; if mutual compensations for certain factors are permitted as indicated by plan 4, then the population target should be kept below 760 million, and its possible-satisfactory extent is above 0.9. However, we cannot but consider the actual conditions of population development, particularly the average number of births by a married couple that is acceptable to the masses of our country. As to the peak of ageing coefficient that will appear in the forties of the next century, we may use our economic strength to tide us over.

Thus, plan 5 is formed with 700 million as its population target and 0.65 as its possible-satisfactory extent. It seems plan 4 is desirable and, if mutual compensation for certain factors is permitted, plan 6 is formed. Here the population target may be raised to 700 million-1 billion.

Diagram 4 indicates the possible-satisfactory extents of the six plans. From the curves we can clearly see that after 100 years from now on 700 million appears to be optimal target of total population and that if things are stretched a bit, the target may be raised to 700 million-1 billion.

We feel that the problem of total population target is one of utmost importance to our country. With this target set, we can find out the best tactics to control the process of population development, and a clear orientation for population control in our country. At the same time, we can know from various conditioning factors which are serious, which are moderate, which should be given double care, which are the focal points of work. This will led itself to the planning and coordination of various kinds of work.

With time, the development of science and technology, the progress of society and the deepening of our knowledge, we may keep determining the total population target to be reached 100 years from now on and aim all policy decisions at this target. In this way, we shall always be in control.

Plans for Comparative Table of Total Population Targets in China

Plans	Factors considered										Total pop. in 2080 (100m)	Possible-satisfactory extent (degree of rationality)
	food		things for use			strength		process of population movement		Compared with other countries		
	grain	fish	land used	water use	air	energy	GNP	no. of births	ageing coeffi-cient			
1	Fully and simultaneously satisfied										10.5	0.25
2	Mutual compensation of factors considered							simultaneously satisfied			14	0.68
3	Satisfied simultaneously							not considered			5.4	0.9
4	Mutual compensation of factors considered							not considered			7.6	0.9
5	Satisfied simultaneously							simul. satis.	not consid.	simul. satis.	7	0.65
6	Mutual compensation of factors considered										7(~10)	0.83

Figure 2

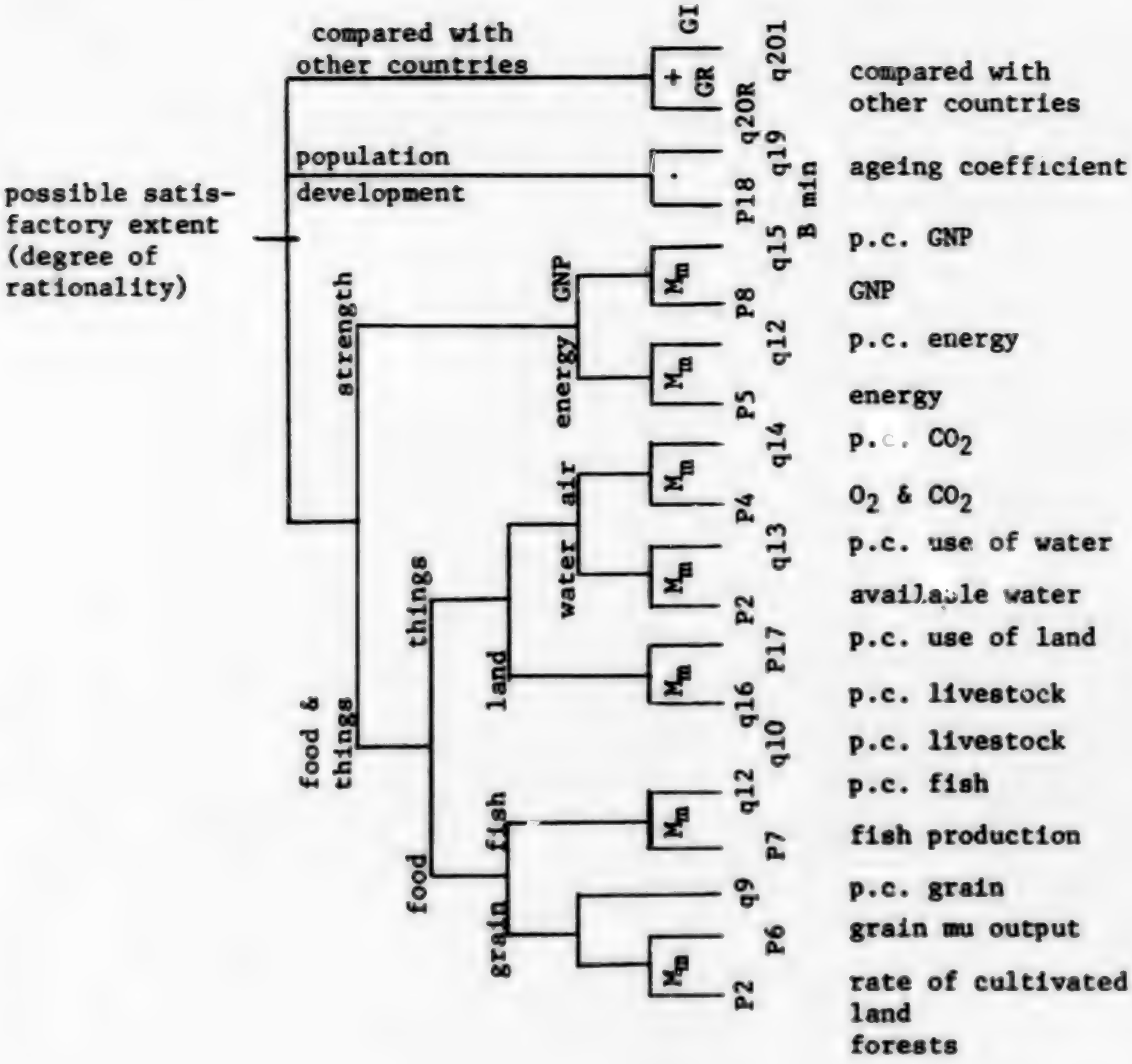

possible satisfactory extent (degree of rationality)
compared with other countries
population development
strength
food & things
things
food
GNP
energy
air
water
land
fish
grain
GI
+
GR
·
M_m
q20R
q201
P18
q19
B min
q15
P8
q12
P5
q14
P4
q13
P2
P17
q16
q10
q12
P7
q9
P6
P2
compared with other countries
ageing coefficient
p.c. GNP
GNP
p.c. energy
energy
p.c. CO2
O2 & CO2
p.c. use of water
available water
p.c. use of land
p.c. livestock
p.c. livestock
p.c. fish
fish production
p.c. grain
grain mu output
rate of cultivated land
forests

Figure 3

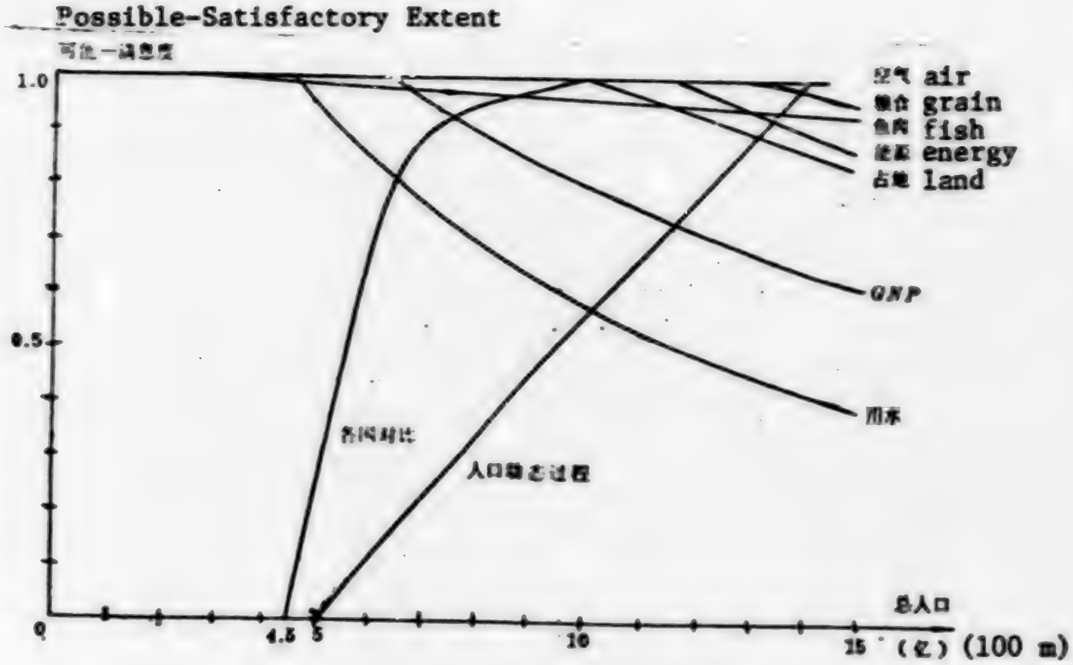
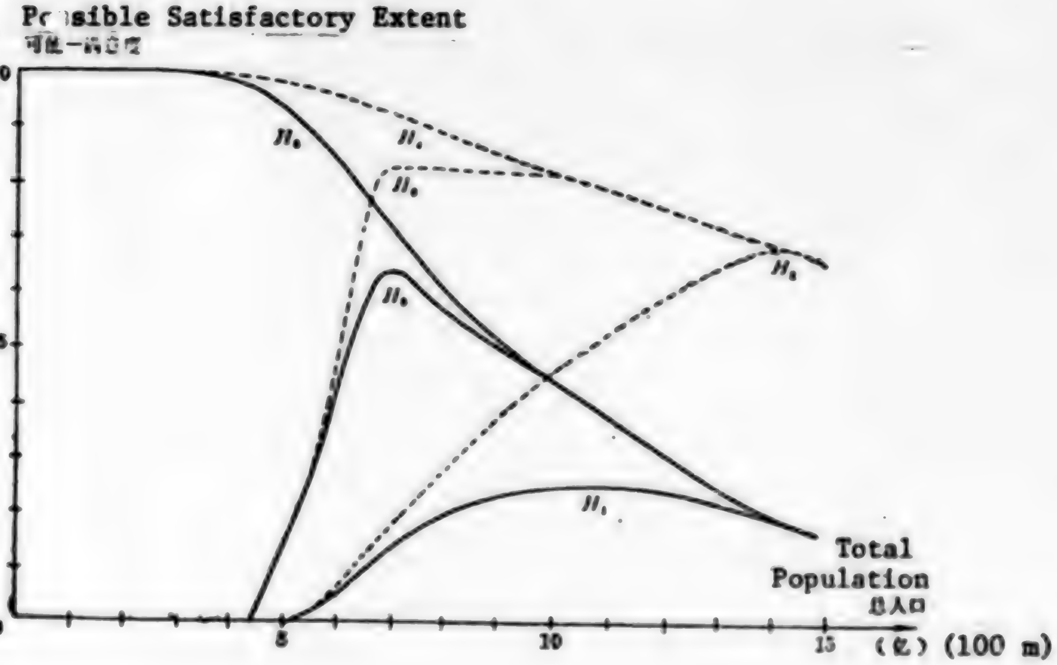


Figure 4



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CSO: 4006/411

REORGANIZATION OF MACHINEBUILDING INDUSTRY DISCUSSED

HK141530 Beijing JINGJI GUANLI [ECONOMIC MANAGEMENT] in Chinese No 6, 15 Jun 81 pp 7-11

[Article by Wu Ming [0702 2494]: "Reorganizing and Restructuring Our Machine Building Industry"]

[Text] Leading comrades from the Party Central Committee recently pointed out that the machine building industry is closely related to the modernization of the whole national economy. At present it is important to readjust and restructure the machine building industry because this is not only a major aspect of economic readjustment but also the starting point for realizing our modernization plan. They also said that many of the principles for reorganizing and restructuring the machine building industry are applicable to many other industries. These directives are of great significance to the present readjustment of our machine building industry and all of industry and to their future development.

(I)

People are familiar with this thesis of Lenin: "A big machine building industry is the only foundation for socialism." For our country, in order to realize the great cause of the four modernizations we must depend on a machine building industry that is capable of producing machinery with advanced technology and in large enough quantities to establish and restructure various economic departments and step up national defense construction. In carrying out the construction principle with technical innovation as the key, the machine building industry, in particular, will have to shoulder even heavier tasks. After three decades of construction, new China already has a substantial scale of production and technical level. In developing our national economy and the four modernizations we must pay attention to and rely on the existing material and technical foundations so that they will be able to fully play their roles. Our industry must no longer rely on carrying out new and big projects as a way to expand reproduction, nor must we rely on extension to expand reproduction. On the contrary, we must turn to intension as the key and rely on the 40 million workers and staff of the present 370,000 enterprises to improve efficiency of the means of production and create more material wealth through tapping potential, restructuring and strengthening management. In the past we relied on building new projects as the key; but in the future it is necessary to take transforming the existing material and technical foundations as the key because this measure is a strategic principle for building our economy.

People still remember that following the initial establishment of the foundation for industrialization during the first 5-year plan, it was suggested that we resort to the principle of carrying out technical innovations as the key. But this suggestion was basically not carried out even many years later. As a result, much money was spent but with little economic effect. Undoubtedly it is still necessary in the future to carry out new and important projects, but the key task must be to constantly restructure the existing material and technical foundations so as to comprehensively increase economic and technical results. This is a new method never used before in economic construction. Undoubtedly when our socialist construction is advancing along this road, the machine building industry, which is the basic lever in restructuring the national economy, will be able to play a still greater role.

(II)

Will our machine building industry be able to meet the need of the principle which takes technical innovation as the key? Viewing the present situation, it is hard to say; but through hard work in reoganizing and restructuring, it is possible for the machine building industry to meet the need.

Our machine building industry has made great progress over the past three decades and we have formed an industrial system of considerable size, with fairly complete departments and of a considerably high standard. There are tens of thousands of key machine building plants and hundreds of thousands of ordinary machine building plants, coupled with a growing contingent of workers. With considerable fixed assets, these enterprises have over the past many years supplied a great amount of technical equipment of a certain standard to various national economic departments and for national defense construction. About 80 percent of the total equipment of the basic national industrial departments was manufactured domestically. At the same time, these enterprises have also supplied the market with an increasing quantity of durable consumer goods. We must affirm and not underestimate the great achievements we have made and the material and technical foundations that have been formed, because in restructuring the whole national economy and carrying out technical innovations in the future we have to rely and pin our hopes on them. Belittling our ability and regarding foreign machinery as more advanced and our machine building industry as inferior is impractical and wrong.

But at the same time we must understand that the development of our machine building industry has been limited because of the effect of the mistaken "leftist" leadership and because we followed a backward foreign management system for quite a long period. There are still a number of problems even today and these mainly include dispersed management, low development of production technology and improper service orientation.

Organizationally, our machine building industry system is in a chaotic situation because management is dispersed and the departments concerned only mind their own business. Departmentally, there are the two systems of military industry and civilian industry in our country, coupled with manufacturing and maintenance systems and general equipment and special equipment manufacturing systems. Many departments across the country now have their own machine building industry. Provinces, municipalities, administrative regions, prefectures, people's communes and production brigades also have their own machine building industry, and they all have their own separate lines of business and vie with each other in turning themselves into "big and complete" and "small and complete" organizations. As a result, their economic relations, specialization and coordination have been seriously affected, and consequently a number of examples of irrationality and repetition in construction, production, scientific research and technological imports causing enormous wastefulness have appeared. For example, there were three big neighboring machine building plants in Beijing each with its own casting forging, tool, maintenance and heat treatment shops. They were developing into complete plants but this development caused serious waste of productivity and energy.

Quite a number of our machine tools are of low quality, with low efficiency and old structures. The basic technology in the machine building industry such as casting, forging, welding, processing and surface treatment has long involved backward methods. As a result, many of our products are of low quality and efficiency and consume enormous amounts of raw materials and energy. In short, the products of our machine building industry are about 10 to 20 years behind the advanced world standard. For example, our vehicle manufacturing company in Changchun was completed in 1956, and it was then more advanced technically than Japanese motor vehicle factories such as Toyota. Not long ago when a Japanese manufacturers delegation was visiting the Changchun motor vehicle plant they were surprised to find that China had such an advanced and big motor vehicle plant at that time. But what surprised them more was that after two decades and more, the output of this plant had only increased 100 percent while its key equipment, production technology and main products were basically unchanged, and its production technology was lagging far behind that of Toyota and other Japanese companies.

Most of the main products of our machine building industry have for a long time been mainly for use in heavy industry and capital construction and for high accumulation but not for technical innovation of enterprises. The usefulness of these products in agriculture, light industry, science, culture and education, urban construction and the people's livelihood has been limited. Our machine building industry is characterized by a narrow range of services, limited methods of production and an irrational structure, and consequently it has failed to meet social needs. As a result, the following situations have occurred during readjustment work. On the one hand, a number of machine building plants, particularly the key plants that are capable of increasing the productivity of heavy industry, do not have enough work to do. On the other hand, there are a number of production methods but no plant has actively carried out these methods or those plants that wanted to do the job have not had the necessary conditions. In addition, because of our limited technical level, our machine building industry is still not able to manufacture big and advanced precision products. These situations are often referred to as "sometimes not having ehough to eat but sometimes having too much."

(III)

The above-mentioned situations show that it is urgent to reorganize and restructure our machine building industry.

The basic aspect and requirement in reorganizing and restructuring our machine building industry is to realize coordination between specialized departments and economic unity so that our machine building industry will be rational organizationally; to renovate backward technology and gradually restructure the present fairly advanced technology so that the technology of our machine building industry will be gradually modernized; and to readjust the service orientation of the whole machine building industry from mainly serving capital construction to the "four services" of technical innovation of the national economy, domestic markets, expansion of exports and modernization of national defense.

Over the past few years, our machine building industry has done some efficient work in these aspects and it has made a good start. But taken as a whole, the achievements are not obvious and experiences are not adequate, and therefore it is necessary to continue to work and to explore.

(1) About Reorganization

To reorganize means to gradually break through the boundaries between regions and departments and change the situation of "big and complete" and "small and complete" and take the road of coordination between specialized departments and of economic integration. Coordination between specialized departments and economic integration are major questions that belong to the sphere of economic management and they are necessary for socialized production. Following the development of social division of labor, the specialization in the machine building industry will expand to parts and technology, and consequently enterprises will increasingly rely on each other. Objectively this requires that coordination be organized widely and economic integration be realized so as to meet the increasing needs of socialized production.

It is necessary for the guiding thought for reorganization to continue to be implementation of the principle of "bringing strong points into play, protecting competition and promoting unity" and the principle of economic rationality and production facility. Integration may take many forms. The forms of the unity that have appeared in the machine building industry include: (1) more relaxed integration such as sales, supply, export and design work of production units and user departments; (2) organizational integration among specialized products such as joint venture vehicle companies and radio set companies; (3) integration according to different basic parts, components and technical organizations. Such integration may be carried out within a region, among regions or even nationally. The forms and the size of the integration depend on the actual situation but it is advisable to proceed from a loose integration to a tight integration, from a smaller scale to a bigger scale and to gradually advance from a lower stage to a higher stage. Supply, marketing and sales can be combined first, followed by the integration of industry, trade and commerce; but the integration of staff, finances and goods and materials must be carried out later.

In order to effectively and stably promote reorganizing work, it is better to begin this work among trades and in major cities with key products of key enterprises. On the basis of study, investigations and unified planning it is necessary to set up trade organizations on a trial basis. Experiences in some localities prove that we must pay attention to the following two points in the method of carrying out restructuring work. One is to combine the method from bottom to top with that from top to bottom so as to meet local as well as overall [demands]. Another is to combine administrative methods with economic methods so as to coordinate macroeconomic and microeconomic interests. In order to ensure smooth implementation of reorganizing work, administrative intervention may be exercised as the key when necessary so as to promote economic rationality through administrative methods. When we talk about strengthening leadership over the macroeconomy, we include direct intervention by the state through administrative methods. Of course, this intervention can only be carried out under the premise of putting the interests of the whole country in the first place and of combining the economic interests of all the parties that have joined in the integrate. We can in no way "establish family links by force." In the process of reorganizing, it is imperative to follow the principle of mutual benefit and of selecting the best departments for integrating. A number of the problems arising during the course of integration usually reflect "power" and "interest." Such problems include who will lead the enterprises that have joined together, who will have the right to sell, produce and supply and to distribute profits and how to price the products. All the enterprises concerned must be equal in these respects and they must share equal interests so that they will be able to progress at the same pace. In this respect, two situations must be prevented; one is that big factories must not squeeze out small factories and the factories with ownership by the whole people must not squeeze out factories with collective ownership. Another is that big factories cannot take over the burdens from small factories and the factories with ownership by the whole people cannot take over the burdens of the factories with collective ownership out of consideration for households with economic difficulties. All these situations run counter to the principle of economic rationality and they cannot exist for long.

In the process of reorganizing, some machine building industrial enterprises will be closed down, suspended, merged or shifted to other production. With regard to industrial departments, the situation of the machine building industry is uneven, but generally speaking, the products of the industry are in excessive supply. In the past, a number of factories were built blindly. Statistics show that over the past 15 years, an average of 12 machine building factories have been built every day causing serious repetition of production. Consequently, these factories do not have enough raw materials and it is difficult for them to continue their operations. Therefore, in the future it is forbidden to set up factories arbitrarily. In addition, the factories that have for a long time showed losses rather than gains and those with small-scale production, backward technology, very high consumption of raw materials and energy, low quality and high-priced products that are unsalable must be resolutely closed down or shifted to other production. But this work involves relocation of staff and workers and therefore it is advisable to shift as many factories to other production and close down as few as possible. We can in no way advocate the method of "filling the gap" for the factories with poor economic results and no prospects; otherwise we will cause the situation to worsen. In assigning tasks it is imperative to order and arrange for goods commodities. Studies must be carried out so that we will be able to establish standard technology for our products and permit the existence of systems for production. The factories that fail to reach the defined standard will have to stop production for the purpose of readjustment. This measure will check and control building factories blindly and producing slipshod products and improve the quality and efficiency of our machine building industry.

(2) About Restructuring

In order to raise the level of the entire machine building industry, it is imperative to combine reorganizing with restructuring. As the duty of machine building industry is to serve the technical innovation of the national economy and to supply various departments with good-quality equipment, it is necessary for the industry to first of all reform its own technology.

Above all it is imperative to resort to rational technological policies. So far we have not had rational and stable technological policies for many years. At times the policies have stressed indigenous methods and at other times foreign methods, and this practice is not in accord with the needs of the era in the development of technology, nor with the conditions in our country. In restructuring technology and resorting to advanced technology we must proceed from the realities of our country. We cannot just consider our intermediate-range interests and not work hard to improve technology. On the other hand, we cannot depart from our capabilities and blindly seek advanced technology. The correct principle is that we should have advanced and economically applicable technology with economic and technical results as the key. Our machine building industry and various departments must pay attention to this aspect in carrying out technical restructuring.

Technical restructuring must also develop from a lower to a higher stage. We must pay attention to technical restructuring partially and at the same time strive to make important breakthroughs. It is necessary to combine both correctly so as to link intermediate interests with long-range interests. It is necessary to strengthen research and development work, do a good job of developing technology and technical equipment and replace old products with new ones step-by-step and in a planned way. We must also actively promote "three generations of products." That is, improve first-generation products that are now being made; trial-produce second-generation products by producing new products in the near future; and make preparations for research work for third-generation products that are to be produced in the future. At the same time, explorations must be carried out for the fourth generation of important products. It is also necessary to consider long-term tendencies and strengthen basic research work and study. In short, before a product ends its cycle of prosperity and then "decline," we must be able to produce a new product to replace it.

The quality of enterprises must be improved through technical restructuring. When we were restructuring the enterprises in the past, we often concentrated our efforts on merely increasing productivity and adding plants and equipment and personnel and we neglected the work of improving the technical level. The requirement for the present technical restructuring is more than just tapping potentials, innovating and restructuring. This requirement includes: (1) Strengthen scientific research and study and carry out technical restructuring so as to enable enterprises to produce new products to replace the old and produce complete sets of equipment. (2) Restructure technical equipment so as to lower consumption and raise labor productivity. (3) Set up an experimental base and control system so as to improve product quality and develop new products. (4) Reorganize production lines and manufacture new equipment so that our enterprises will be able to advance from producing preliminary products to producing high quality products. (5) Train personnel so as to enable enterprises to use modern management technology and improve management and the operational level. We must pay attention to and strengthen all these tasks as they are necessary for enterprises to improve their overall productivity.

In order to raise the level of the entire machine building industry it is imperative and vital to train, improve and rationally make use of the technical force. The problems of the technical force in machine building industrial departments are: First, not enough personnel; second, a low level and slowness in improving it; and third, not every one has the chance to use his talents, personnel are assigned work that is unsuitable to them or they do not have work to do or do not have a chance to carry out their roles. This situation must be gradually changed. At the same time, it is imperative for enterprises to strengthen their own scientific force and designing force and to improve the work of importing, learning from, digesting and grasping foreign technology and to combine these two aspects because this work is important in strengthening technical restructuring.

(3) About Readjusting Service Orientation

An important purpose of readjusting our machine building industry is to rationalize the standard of this industry so that it will be able to meet various social needs. To a certain extent, the correct service orientation is the premise and manifestation of reorganizing and restructuring.

Over the past year and more, the departments of the First Ministry of Machine Building have begun to implement "six changes" and "five services" to basically reflect the readjustment of the service orientation of the whole machine building industry and the readjustment of other aspects. The "six changes" are: Change from mainly serving heavy industry to also serving agriculture, light industry, urban construction and the people's livelihood; from mainly serving the building of new factories to serving old factories in tapping potential, carrying out technical innovation and reforms; from mainly being engaged in manufacturing to engaging in designing and arranging for complete sets of equipment, installing, commissioning and repairing equipment and supplying spare parts as well as training operators; from serving the domestic market to becoming active in entering the international market; from engaging in small-scale to engaging in mass production and gradually developing specialized production; from concentrating efforts on increasing the scale production and quantity to improving quality, variety, supply time and lowering costs so as to constantly improve the management of enterprises. The "five servings" are: While serving heavy industry and capital construction, also serve the needs of agriculture, forestry, animal husbandry, sideline production and fisheries, light industry, the market and the people's livelihood; serving the needs of old factories in tapping potential, technical innovation and reformation; serving the needs of the urban and rural collective economy and commercial enterprises; serving the needs of maintenance and technology in production and serving the needs of expanding exports. Practice has proved that this readjustment is very important, and if we continue with it, our machine building industry will be able to meet still better the various needs of society while it is developing normally.

This readjustment of the machine building industry must take various needs into consideration but we must also emphasize carrying it out. According to the present situation, it is imperative to grasp well the following three points: Step up technical restructuring of the existing enterprises; promote the production of industrial consumer goods and expand the exports of mechanical and electrical products. But in addition to grasping key tasks we must pay attention to other tasks. It is important to handle well the relationship between the processing industries and the basic industries and between industrial consumer goods and equipment.

It is of practical significance at present for the machine building industry to serve light industry, textile industry and to promote the production of industrial consumer goods. With increased output of industrial consumer goods, the needs of the people's livelihood will be met, the markets will become brisk, currency will be recovered, the people's income will be increased, finances will be balanced and exports will be increased to earn more foreign exchange. With all those, our national economy will be freed from the current difficulties. In addition, it is a binding duty of our machine building industry to support light and textile industries. Lenin said: "The making of the means of production is not for the sake of the means of production themselves; it is because the industrial departments that are producing consumer goods are increasingly demanding more means of production." Over the past year and more, the machine building industry has supported light and textile industries with enormous quantities of special equipment and various types of technical equipment for technical reform. In addition, according to the principle of similar production technology and economic rationality, our machine building industry has also begun processing parts for some light industrial products and producing complete sets of equipment for light industry; it has also directly produced a certain quantity of durable goods. Some localities have, through unified planning and according to the requirements of the development of light industry, shifted some machine building factories to light industrial departments to engage in producing light industrial products because their products had no definite orientation and they did not have enough work. All these measures have had fairly good results in expanding the production of light and textile industries, improving the quality of products and in reducing consumption, and therefore such measures must be continued. The basic way to support light and textile industries is to use production technology of the machine building industry, supply good equipment and create conditions for light and textile industries to advance toward specialized modernization. Even though it is necessary to shift some factories to other production, it is very important and it must be carried out in a planned way.

In readjusting the service orientation it is imperative to strengthen leadership over planning. The best way for the machine building industry to serve various national economic departments is for all these departments to have fairly stable planning or serious losses will result. Cases of poor planning have appeared time and again in the past and they must in no way reappear in the future. Measures have been taken since last year to carry out regulation by market mechanism and broaden the scope of production. Such measures are correct and they have had quite good results. Therefore, these measures must be affirmed and continued in the future. The question is to investigate well the market situation and make better predictions so that the auxiliary regulation by market mechanism can be correctly combined with the regulation by planning mechanism that plays the main role. Now various departments concerned are very enthusiastic about producing industrial consumer goods, particularly those in short supply. This is a good situation. But we must in no way do this work rashly without planning. It must be carried out carefully and according to our capabilities. Boldness in carrying out this work must be prevented. The state's unified planning and rational management are indispensable and very important, and therefore they must be strengthened.

Reorganizing and restructuring the machine building industry and readjustment of its service orientation must be considered from the important angle of improving economic results. Viewing our national economy from this angle, the present investments must bring economic results in the future. Increasing economic results is the way out for our economy. Our machine building industry must, through reorganizing and restructuring, improve the quality of its products, develop new products, improve technical services, establish additional economic departments with modern equipment to meet market demand by producing durable consumer goods, increase exports and be active in entering international markets. By doing so, not only will the level and results of the machine building industry itself be considerably improved, but also socioeconomic results will be greatly improved. This is also a target of the machine building industry in carrying out reorganizing and restructuring.

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JOURNAL ON USE OF ENTERPRISE FUNDS

HK220515 Beijing JINGJI GUANLI [ECONOMIC MANAGEMENT] in Chinese No 6, 15 Jun 81 pp 37-39

[Article by Liu Chunqin [0491 2504 0530]: "It Is Necessary to Strengthen Guidance Over Utilization of Funds Retained by Enterprises for Their Own Use"--note passages within slantlines denote boldface type]

[Text] Since the expansion of enterprise autonomy in 1979, funds at the disposal of enterprises have been increased notably. The total annual balance retained by enterprises for their own allocation amounts to approximately 15 billion yuan, comprising the following items: profits retained as their own share, basic depreciation funds for fixed assets, funds for major overhauls, funds for replacement and transformation set aside according to output, income from improved assessment value of and rental from fixed assets, and new profits resulting from tapping potentials, renovation and restructuring supported by production development funds of the enterprises (according to the stipulation of Sichuan Province, this newly made profit will be retained by the enterprises for 2 years and used at their own discretion. The amount differs with the various enterprises, for some it is equivalent to 1/3 of the profits). This financial source taken as a whole is quite considerable, and its utilization exerts significant influence on the whole national economy. For this reason, in order to improve the performance of funds retained by enterprises for their own use, to promote economic development, and to achieve liveliness without chaos, it is necessary for the state to strengthen guidance and management of these funds.

To strengthen guidance over these funds retained by the enterprises for their own use means to stipulate certain rules to be followed as principles as well as to adopt certain concrete measures in regard to the allocation of these funds on the part of the enterprises without infringing on basic interests of the enterprises. In the light of the present situation of our country, it is necessary for the state to strengthen guidance in the following respects.

/1. Unify the fund categories. This is a prerequisite for compiling statistics and for carrying on supervision in regard to the allocation of the various funds, and a further step for controlling the proportion between consumption and accumulation./ Currently, in our country various categories of funds have been set up in various regions and various enterprises. Most of the enterprises have accounts for production development funds and for welfare and award funds. In addition to these, some are also keeping accounts for plant construction funds or reserve funds. Some enterprises have set up welfare and award funds for their staff and workers and have done nothing in respect to production development funds. Perhaps this is necessary in the initial stage in order to gain experience, but in the long run this should not be so. A unified rule should be made at a suitable moment. In the meantime, for the enterprises that carry on the practice of profits sharing, it is necessary to add another fund, namely the price adjustment fund. Now the state is making use of the deviation of prices from their value for the purpose of regulating the relationship between production and sales of certain commodities, and of balancing state revenue and expenditure. As a consequence, of the profits made by the enterprises, a part represents the surplus value created by the staff and workers of the enterprises, and the other part is the extra income resulting from price policies, having nothing to do with the labor of the enterprises. The purpose of setting up a price adjustment fund is to set aside that part of the profits not related to the performance of labor in the enterprises so that part of it can be turned over to the state, and the remaining part can be kept by the enterprises in the form of price adjustment funds to iron out the advantages and disadvantages within the enterprises caused by unreasonable pricing practices. Another thing to be done is to combine the housing construction fund for staff and workers and the fund for collective welfare. The combined funds can be called housing, culture and welfare funds (for the sake of brevity, they can also be called collective welfare funds). As a result, for enterprises that carry on the practice of profitsharing, there should be four funds, namely the production development fund, the housing, culture, and welfare fund, the awards fund for staff and workers, and the price adjustment fund. The enterprises that are undertaking experimental responsibility for their own profits and losses should set up another fund, a reserve fund, making five funds altogether.

The financial allocation of these funds should differ as the types of enterprises differ. In corporations and other types of combined organizations, generally speaking, plants at the basic level have set up award funds for staff and workers, housing, culture and welfare funds as well as a partial production development fund (that is, a part is turned over to the corporation for the development of major projects). As for the other funds, for example reserve funds, price adjustment funds, partial production development funds, shares of foreign exchange earned in export trade, and so on, they are left to the corporation for unified allocation. In consequence, the performance of these funds will be enhanced. Of particular significance, is the setting up of price adjustment funds in the corporations. This might provide a solution in ironing out the disparities brought about by the deviation of prices from value.

/2. Lump all the funds together./ For the trial-point enterprises, a share of the profit or profit after tax is the only source of special purpose funds for production development. The basic depreciation fund, and the income from assessment of orice of fixed assets and from rentals are set aside and kept in separate independent accounts, not included in the corresponding special purpose funds. However, in the meantime, it is stipulated that the enterprises are given the right to combine these funds with the production development fund in deployment of the funds. This being the case, why should they not be lumped together in a reasonable manner? An appropriate combination undoubtedly is beneficial to the strengthening of financial management, and better control of the enterprises as well as the social consumption and accumulation. With the combination of the funds, it should be kept in mind that they are still kept for their original purposes and are not to be used for other purposes.

1) The production development fund: This includes part of the profit share or profit after tax (not including the profit of enterprises arising from the factor of price policy, the same below), the basic depreciation fund for production equipment, income from price changes of production equipment and from rentals, replacement and renewal funds set aside according to output, and new profit arising from tapping potential, renovation, and restructuring supported by the production development funds of the enterprises.

2) The housing, culture and welfare fund: This includes part of the profit share or profit after tax, the depreciation of living facilities, the income from change of price of such facilities and the daily business earnings of such facilities.

3) The price adjustment fund: Due to the factor of price policy, the enterprises gain part of the extra profits.

4) Award fund for staff and workers: Part of the profit share or profit after tax.

5) Reserve fund: Part of the profit share or profit after tax.

As a result, with the exclusion of the above-mentioned funds, the enterprises have only one independent fund, namely the major overhaul fund, which should be kept as a special purpose fund so the present equipment may be kept in good condition, and the simple reproduction of the enterprises may be maintained.

/3. Devising a method of fund allocation with a set purpose./ This means to direct the initiative of the enterprises to the set economic targets of the state by means of economic methods. In order to attain this end, the first thing the state must do is to designate the key problems awaiting solution in a specified period. The second thing is to correlate allocation of the funds to these targets so as to stimulate the growth of the national economy.

One key problem in the development of our current economy is the shortage of energy, raw materials, and good quality and new products. Naturally, the allocation of funds of various categories should be related to these problems as much as possible. The energy products used by the enterprises are different, so are the consumption levels of fuel of the various enterprises. This makes the calculation of allocating the funds quite inconvenient. For this reason, the energy-saving and raw material consumption indicators should be replaced by production-cost reducing indicators (raw materials, fuel, and consumption of power generally comprise about 70 percent of costs). In this way, the allocation of the funds of the enterprises can be correlated with the following four indicators: Cost of production, volume of production, the rate of high quality products, and the rate of profit. The ratio of profit for each indicator should also differ. As it is more difficult to reduce costs, the ratio for profit in this respect should be larger. Since it is easier to increase the volume of production, its ratio of profit should be smaller, and consideration should be given to the question of whether the product is in short or in excessive supply in the respective profit ratios. In the case of high quality and new products, since in the early stage of their development very possibly their profits are meager, the enterprises should either be given all the profits within a specified period, or be given an encouragement profit share out of the profits of the enterprises, taken as a certain percentage of the allotment price (or wholesale price) of the products. Ultimately, the enterprise then sets aside a certain portion of its profits earmarked as its fund. However, this should not be the major part of its total funds. In this way, the enterprises are made to turn their attention to cost reduction of their products and increasing the output of products in short supply and the enhancement of their quality as well as the development of new products.

The key problems arising from the development of the national economy may change with the passage of time. By then, the allocation of enterprise funds will also change in respect to their aims and methods of allocation. To appropriately adjust the ratios of fund allocation and the targets of encouraged development is an important task in management of the leading economic bodies henceforth.

/4. The designation of fund allocation. The state gives guidance to improve effective use of the funds./ Here, first of all, the enterprises must be allowed to manage the funds, and the basic uses of the funds must be clearly specified. The purpose of this is to urge the enterprises to make good use of the funds and to devote the funds to the major targets of the state awaiting facilitation. This is a task relating to the economic policy of the state as well as a basic premise in deciding the proportions of the various funds.

At present, the old enterprises are facing two major problems, replacement and transformation of facilities and housing for staff and workers. Replying solely on the production development funds of the enterprise to replace and transform existing facilities obviously provides limited financial strength. Consequently, we must study and develop a production development fund for our enterprises which is suitable to our national condition. Study must also be made as to how to make use of other funds.

1) The production development funds should be mainly devoted to the purpose of upgrading and redesigning products. Sometimes, the upgrading and redesigning of products are mutually effected by the replacement and transformation of plant facilities. As new products are designed and developed, the old plant facilities must be transformed somewhat according to the requirements of production techniques. It should be pointed out that this is a problem of adding certain facilities that are needed, rather than an overall renovation and restructuring, still less is it a problem of large-scale expansion of production capacity in relation to replacement and transformation of facilities. Tasks in this regard will be undertaken after readjustment of our national economy and the completion of overall planning and preparations.

2) The housing, culture, and welfare funds, for the present, should be focused on dealing with the housing problem of the staff and workers of the enterprises so that their living conditions may be improved. As for the housing problems of the peasants, the problems should be dealt with by the collective and the peasants' own efforts.

3) There is no problem in regard to the award funds for staff and workers being used to give awards to the staff and workers. However, certain principles must be set. In the regulations in this regard, aside from setting limits to bonuses

granted and other matters, it should also be stipulated that enterprises be allowed to grant bonuses at the end of the year to their staff and workers. With the total bonus kept unchanged, taking part of the bonus (for example 30 percent) as a yearend bonus, perhaps, will be beneficial to both the state and the enterprises. Of course, yearend bonuses are to be granted only upon completion of certain prerequisites. One prerequisite is that the enterprise must complete all the tasks assigned to it by the state. Another is that no violation is committed in regard to financial discipline (prompt and full payment of tax and profits to the state). Without the fulfillment of such requirements, bonuses should be reduced or withheld. With such a yearend bonus, enterprises will undoubtedly be urged to improve production and management as well as mobilize the initiative of the staff and workers in keeping a watchful eye on the economic disciplines to which the enterprise must abide. In the meantime, this is a safeguard against granting bonuses for exceeding the quota before knowing the business results of the whole year.

Naturally, in order to strengthen state guidance over the utilization of funds retained by the enterprises for their own use, studies must be made and conclusions arrived at in regard to the proportions of the various funds. For example, there is the problem of the capability of the funds to make good the shortages in question, and under what conditions should such a service be given. There is also the problem of priorities with respect to the setting up of the various funds. When the enterprise earnings are not enough to cover all the funds, then which funds should be set up first, and which should follow? In short, with respect to the economic activities of enterprises that wield expanded power, the state is still groping for experience in order to provide them with guidance to achieve liveliness and to screen out chaotic elements. It is the purpose of this essay to present to the readers the author's preliminary viewpoints so that these viewpoints may be studied and discussed by the readership.

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